Aqueous coating material, process for its preparation, and its use

Claims

1. An aqueous coating material comprising

A) at least one water-soluble or -dispersible polyester,

B) at least one water-soluble or -dispersible polyurethane acrylate,

C) at least one amino resin which per se or in the presence of ingredients (A) and (B) is water-soluble or -dispersible, and

D) at least one color and/or effect pigment and/or one filler, and also, if desired,

E) at least one polyisocyanate,

characterized in that the polyester (A) is preparable from

a1) a mixture comprising

a11) from 40 to 80 mol% of at least one aliphatic or cycloaliphatic poly-

carboxylic acid or at least one esterifiable derivative of an aliphatic or cycloaliphatic polycarboxylic acid or a mixture of at least two of these starting products,

a12) from 20 to 60 mol% of at least one aromatic polycarboxylic acid, at least one esterifiable derivative of an aromatic polycarboxylic acid or a mixture of at least two of these starting products;

and

a2) at least 60 mol% of at least one aliphatic or cycloaliphatic polyol whose molecule includes at least one structural element $-C(R^1R^2)-CH_2OH$ in which the radicals R^1 and R^2 stand for aliphatic, cycloaliphatic or aromatic hydrocarbon radicals having from 1 to 20 carbon atoms or for methylol groups, or a mixture of at least two of these starting products.

2. A process for preparing an aqueous coating material by mixing at least the following ingredients in an aqueous medium:

A) at least one water-soluble or -dispersible polyester,

B) at least one water-soluble or -dispersible polyurethane acrylate,

C) at least one amino resin which per se or in the presence of ingredients (A) and (B) is water-soluble or -dispersible, and

D) at least one color and/or effect pigment and/or one filler;

characterized in that the polyester (A) is preparable from

a1) a mixture comprising

a11) from 40 to 80 mol% of at least one aliphatic or cycloaliphatic polycarboxylic acid or at least one esterifiable derivative of an aliphatic or cycloaliphatic polycarboxylic acid or a mixture of at least two of these starting products,

a12) from 20 to 60 mol% of at least one aromatic polycarboxylic acid, at least one esterifiable derivative of an

aromatic polycarboxylic acid or a mixture of at least two of these starting products;

and

a2) at least 60 mol% of at least one aliphatic or cycloaliphatic polyol whose molecule includes at least one structural element $-C(R^1R^2)-CH_2OH$ in which the radicals R^1 and R^2 stand for aliphatic, cycloaliphatic or aromatic hydrocarbon radicals having from 1 to 20 carbon atoms or for methylol groups, or a mixture of at least two of these starting products.

3. A process for preparing an aqueous coating material by

I) mixing at least one of the following ingredients in an aqueous medium:

A) at least one water-soluble or -dispersible polyester,

B) at least one water-soluble or -dispersible polyurethane acrylate,

C) at least one amino resin which per se or in

the presence of ingredients (A) and (B) is water-soluble or -dispersible, and

D) at least one color and/or effect pigment and/or one filler;

to give component (I);

and

II) mixing component (I) with at least one polyisocyanate (E),

characterized in that the polyester (A) is preparable from

a1) a mixture comprising

a11) from 40 to 80 mol% of at least one aliphatic or cycloaliphatic polycarboxylic acid or at least one esterifiable derivative of an aliphatic or cycloaliphatic polycarboxylic acid or a mixture of at least two of these starting products,

a12) from 20 to 60 mol% of at least one aromatic polycarboxylic acid, at least one esterifiable derivative of an

aromatic polycarboxylic acid or a mixture of at least two of these starting products;

and

a2) at least 60 mol% of at least one aliphatic or cycloaliphatic polyol whose molecule includes at least one structural element $-C(R^1R^2)-CH_2OH$ in which the radicals R^1 and R^2 stand for aliphatic, cycloaliphatic or aromatic hydrocarbon radicals having from 1 to 20 carbon atoms or for methylol groups, or a mixture of at least two of these starting products.

4. The coating material of claim 1, the process of claim 2 and the process of claim 3, characterized in that the starting products a1) and a2) are reacted with one another in a molar ratio a1):a2) = 1.1-2:1, preferably 1.2-1.7:1, and in particular 1.25-1.6:1.

5. The coating material of claim 1 or 4, the process of claim 2 or 4 and the process of claim 3 or 4, characterized in that the degree of branching of the polyester (A) is from 1.0 to 2.0, preferably from 1.2 to 1.9, and in particular from 1.4 to 1.8, mol/kg.

6. The coating material of one of claims 1, 4 or 5, the process of one of claims 2, 4 or 5 and the process of one of claims 3 to 5, characterized in that the polyester (A) has a number-average molecular weight of from 650 to 2 500, preferably from 800 to 2 250, and in particular from 1 000 to 2 000, daltons, an acid number of from 25 to 55, preferably from 27 to 50, and in particular from 27 to 40, mg KOH/g and/or a hydroxyl number of from 80 to 180, preferably from 100 to 170, and in particular from 120 to 160, mg KOH/g.

7. The coating material of one of claims 1 or 4 to 6, the process of one of claims 2 or 4 to 6 and the process of one of claims 3 to 6, characterized in that the ingredients (A), (B), (C), and (D) are employed in amounts of

A) from 2 to 90%, preferably from 3 to 80%, and in particular from 5 to 70%, by weight,

B) from 1 to 80%, preferably from 3 to 70%, and in particular from 4 to 60%, by weight,

C) from 1 to 80%, preferably from 2 to 70%, and in particular from 3 to 60%, by weight, and

D) from 1 to 95%, preferably from 2 to 90%, and

in particular from 3 to 85%, by weight,

the percentages by weight being based in each case on the overall solids content of the coating material, and the amounts of ingredients (A), (B), (C), and (D) always adding up to 100% by weight.

8. The coating material of one of claims 1 or 4 to 7 and the process of one of claims 3 to 7, characterized in that the ingredient (E) is employed in an amount of from 0.5 to 50%, preferably from 1 to 40%, and in particular from 2 to 30%, by weight based in each case on the overall solids content of the coating material.

9. The aqueous coating material of one of claims 1 or 4 to 8, the process of one of claims 2 or 4 to 7 and the process of one of claims 3 to 8, characterized in that the ingredients (A), (B), and (C) are employed in a ratio (A):(B):(C) = 25-70:10-40:10-40, preferably 30-50:20-37:20-37, and in particular 35-45:25-35:25-35.

10. The aqueous coating material of one of claims 1 or 4 to 9, the process of one of claims 2, 4 to 7 or 9 and the process of one of claims 3 to 9, characterized in that the polyurethane acrylate (B) is obtainable by carrying out free-radical

polymerization in an aqueous dispersion in the presence

B1) of at least one dispersed polyurethane resin obtainable from

b1) at least one polyisocyanate alone or together with at least one monoisocyanate;

b2) at least one polyester polyol and/or polyether polyol having a number-average molecular weight of from 400 to 5 000;

b3) at least one compound containing

b31) at least one isocyanate-reactive group and also

b32) at least one group which is anionic and/or is convertible into anions by neutralizing agents,

and/or

b33) at least one nonionic hydrophilic groups;

and also

b4) at least one compound containing

b41) at least one isocyanate-reactive group and

b42) at least one olefinically unsaturated group;

B2) of at least one olefinically unsaturated monomer.

11. The coating material of one of claims 1 or 4 to 10, the process of one of claims 2, 4 to 7, 9 or 10 and the process of one of claims 3 to 10, characterized in that as amino resin (C) a melamine-formaldehyde resin with a low degree of condensation containing C_1 to C_4 alkyl ether groups and containing from 0.1 to 1.5 free imino groups per melamine nucleus is used.

12. The coating material of one of claims 1 or 4 to 11, the process of one of claims 2, 4 to 7 or 8 to 11 and the process of one of claims 3 to 11, characterized in that at least one ingredient (G) curable with actinic radiation is employed (dual cure).

13. The use of the coating material of one of claims

1 or 4 to 12, of the coating material prepared by the process of one of claims 2, 4 to 7 or 8 to 12 and/or of the coating material prepared by the process of one of claims 3 to 12 as a solid-color topcoat material or aqueous basecoat material, especially as a solid-color topcoat material in the OEM finishing and refinish of commercial vehicles.

14. A process for producing single-coat or multicoat color and/or effect paint systems by applying at least one coating material to primed or unprimed substrates, characterized in that said process uses at least one coating material of one of claims 1 or 4 to 12, at least one coating material prepared by the process of one of claims 2, 4 to 7 or 8 to 12 and/or at least one coating material prepared by the process of one of claims 3 to 12.

15. Single-coat and multicoat color and/or effect paint systems producible from at least one coating material of one of claims 1 or 4 to 12, at least one coating material prepared by the process of one of claims 2, 4 to 7 or 8 to 12 and/or at least one coating material prepared by the process of one of claims 3 to 12.

16. Primed and unprimed substrates comprising at

least one single-coat and/or at least one multicoat color and/or effect paint system of claim 15.